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STUDIES IN PROSTATITIS*†

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O'Shaughnessy, Parrino, and White (1956) recently questioned the existence of chronic prostatitis as a clinical entity, highlighting the necessity of re-evaluating prostatic affections and infections. An exhaustive review of the medical literature published in English since 1900 disclosed the following points:

(1) No concise picture of the disease could be found, nor even any with which most clinicians would agree. For instance, in England and the Scandinavian countries, there has been described a severe variety of chronic prostatitis unlike anything encountered in the United States (Giertz, 1955).
(2) Little was known about its aetiology; bacteriological studies have been, at best, equivocal and before the conquest of gonorrhoea, chronic prostatitis was considered a regular sequel to that disease. However, the advent of penicillin has not reduced the frequency of prostatitis, and, more recently, it has been suggested that the disease may have a large psychogenic component (Rosenbloom, 1949).
(3) Diagnosis was difficult because rectal palpation was thought to miss a significant number of "silent" cases, while the examination of prostatic secretions was often misleading, initially at least, in obvious instances of even severe infections.
(4) The results of all forms of treatment were disappointing, and more and more people were resorting to time-accepted methods, chiefly prostatic massage.
(5) There was no unanimity of opinion regarding the significance of chronic prostatitis.

In view of the foregoing, it was decided to carry out the following investigations:

(1) To determine how often presumptively pathological changes were present in the prostates of healthy, asymptomatic men between the ages of 17 and 40, and to see if the incidence of these changes was influenced by certain exogenous factors (to be enumerated later);
(2) To use the data thus acquired to judge signs and symptoms in lower urinary tract problems in which the prostate might be the source of trouble;
(3) To investigate the efficacy of certain therapeutic procedures;
(4) To compare the symptomatology, response to treatment, and prognosis of these groups with those of 277 patients suffering from infectious prostatitis secondary to severe lower urinary tract infection involving the posterior urethra.

(I) Incidence of Asymptomatic, Chronic Prostatitis in Healthy Young Men

Three methods of evaluating the prostate were available: prostatic biopsy, examination of prostatic fluid, and digital palpation of the prostate per rectum.

There is no question that the first would be the most accurate, and palpation the most subjective method. However, in the light of the mission of this Post and the facilities available, the routine biopsy of large numbers of prostates was impractical.

Evaluations based upon prostatic fluid were discarded because it was felt that the white cell content of single specimens was meaningless. This feeling has been shared by many investigators over the past 50 years. However, O'Shaughnessy, Parrino, and White (1956) first demonstrated that there was little

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difference between the cellular content of prostatic fluids obtained from healthy men and that of fluids from men with symptoms of chronic prostatitis. In 1951, I compared the fluids of 92 healthy asymptomatic young men with those obtained from 74 men with severe infectious prostatitis secondary to lower urinary tract infections involving the posterior urethra. These 74 were acutely ill with hot, bulging, exquisitely tender prostates. No material difference between the two groups was noted (Table I).

TABLE I

COMPARISON OF PROSTATIC FLUIDS IN 92 HEALTHY YOUNG MEN AND 74 MEN WITH ACUTE INFECTIOUS PROSTATITIS

White Blood Cells/ H.P.F.	No Urologic Disease		Infectious Prostatitis	
	No. of Patients	Per cent.	No. of Patients	Per cent.
Less than 15 ..	29	31·50	25	33·8
15–30	32	34·8	18	24·3
More than 30 ..	31	33·7	31	41·9

On the other hand, the only objection I could find to palpation of the prostate as a test was the frequently repeated insistence that there was often no agreement between the size, shape, and consistency of the gland and the white cell content of its fluid (Table II).

TABLE II

PREVIOUS ISOLATED SAMPLINGS OF CHANGES IN SIZE, SHAPE, AND CONSISTENCY OF PROSTATE GLANDS, AND WHITE BLOOD COUNT CONTENT IN PROSTATIC FLUIDS OF HEALTHY YOUNG MEN

Place	Year	No. of Men Examined	Men found to be Abnormal* per Palpation		Number of Secretions Obtained	Over 15 White Blood Counts per H.P.F.	
			Number	Per cent.		Number	Per cent.
New Caledonia	1944	77	34	44·2	61	36	59·0
New Guinea	1945	131	37	27·9	111	60	54·1
Japan ..	1951	101	22	21·8	92	63	68·5

* See text for criteria

Three previous samplings (Table II) were obtained, one in New Caledonia during the pleasant antipodal summer of 1944 among troops undergoing intensive combat training with very limited female companionship, another in New Guinea (Papua) during the prostrating heat of the dry season among custodial troops in a womanless world, and a third in Kyushu, Japan, during the mild, stimulating winter of 1951–52 amongst all types of troops with easy access to women. These samplings suggested that three exogenous factors (sexual activity, climate, and work) might influence the physical characteristics of the prostate gland discernible on rectal palpation, and it was decided to investigate their possible roles.

The following standards were used to measure prostate glands by rectal palpation:

Grade O: Glands in which the greatest rectal encroachment was less than 1 cm.
Grade I: Glands projecting between 1 and 2 cm.
Grade II: Glands projecting between 2 and 3 cm.
Grade III: Glands projecting between 3 and 4 cm.
Grade IV: Glands projecting more than 4 cm.

Prostates were graded as follows:

Those which possessed a characteristic rubbery consistency, "Oedema O".
Those ensheathed in a thin layer of oedematous gland, which hid the rubbery feel, "Oedema +".
Those in which no rubbery consistency could be felt, "Oedema + +".
Those with true pitting oedema, "Oedema + + + ".

The minimum pathological rating was considered to be Grade I, Oedema +

In order to minimize the personal element, all examinations in this and the subsequent studies were carried out by the same individual. The gland was palpated, the evaluation was recorded, and the subject was questioned about his physical and sexual activity. Physical activity was divided into four categories:

(1) *Sedentary.*—Clerks, light custodial duties, indoor students and instructors, and administrators;
(2) *Semi-sedentary.*—Unit commanders, students, and instructors with some field classes;
(3) *Field Duty.*—Chiefly demonstration units, including men doing moderate physical labour;
(4) *Tactical training.*—Men in units undergoing combat-type training and men doing heavy manual labour.

Sexual behaviour was also divided into four groups:

I. Coitus at least once a week;
II. More than once a month, but less than once a week;
III. Less than once a month;
IV. Virgins.

To ensure a representative cross section, material was obtained from the following sources:

Volunteers 5 per cent.,
Premarital examinations 10 per cent.,
Periodic physical examinations 40 per cent.,
Candidates for circumcision 25 per cent.,

Patients admitted to the departments of general surgery or urology for repair of herniae or hydrocoele 10 per cent.,

Fertile men from the A-fertility Clinic 10 per cent.

Men with infectious processes anywhere, with urinary or psycho-sexual complaints, varicocoele, undescended testes, and (when taken from the A-fertility Clinic) with total sperm counts of less than 100,000,000, were rejected from the survey. The study covered the year from July 1, 1955, to June 30, 1956, and was carried out at Fort Sill, Oklahoma.

In all, 919 presumably healthy young men were examined: 789 Caucasians (86 per cent.), 111 American Negroes (12 per cent.), and 19 (2 per cent.) of other racial origin. Exactly 76 per cent. were between the ages of 17 and 30, thus making the composition of the group similar to samplings in previous studies (Gartman and Leibovitz, 1955; Gartman, 1956b). 36 (3·9 per cent.) gave a history of previous gonorrhoea and 117 (12·7 per cent.) of non-gonococcal urethritis. Neither Grade III nor IV encroachment, nor oedema + + + was encountered. Of the 919 men, 379 (41·2 per cent.) had prostate glands rated between Grade I, Oedema + and Grade II, Oedema + +.

The four previously-mentioned occupational groups were approximately equal in size. Less than 10 per cent. of the 919 men rode frequently in light vehicles over rough terrain (the importance of this observation will be pointed out later). The incidence of asymptomatic prostatic congestion in the occupational groups was about 40 per cent.

While the monthly prevalence fluctuated widely, ranging from 34 per cent. for November, 1955, to 50 per cent. in May, 1956, no consistent seasonal variations were noted:

July 1955	43 per cent.
August 1955	41 per cent.
September 1955	47 per cent.
October 1955	37 per cent.
November 1955	34 per cent.
December 1955	35 per cent.
January 1956	41 per cent.
February 1956	40 per cent.
March 1956	39 per cent.
April 1956	43 per cent.
May 1956	50 per cent.
June 1956	42 per cent.

Sexual activity, however, produced very significant variations. In Group I (31 per cent. of the total) there were 284 men, and only 72 (or 25·4 per cent.) had glands rated worse than Grade I, Oedema +; in Group II (17 per cent. of the total) seventy out of 158, (44·3 per cent.) were so rated; in Group III (40 per cent. of the total) 188 out of 367 (51·2 per cent.) were so rated; Group IV (12 per cent. of the total) 49 out of 110 (44·5 per cent.) were so rated.

There were 433 single men in the four groups, and 110 (25 per cent.) were virgins.

Discussion.—The recognition that apparently healthy men may have asymptomatic aberrations in prostatic size, shape, and consistency, and/or in the white blood cell content of prostatic fluid is not new. Over 20 years ago Herbst (1934) estimated that these changes could be found in as many as 30 per cent. of all men, while Johnson (1954) placed the number affected at 34 per cent. The mere fact that certain asymptomatic anatomical or physiological changes are common is not *a priori* evidence of their innocence as shown by athero-sclerosis, yet nothing has been presented here to suggest that the alterations found were of pathological significance; on the contrary, the changes in size, shape, and consistency of the prostate gland on rectal palpation seemed to be a response to physiological and psycho-sexual activity. The causes of the variations in the white cell content of prostatic fluid expressed during prostatic massage were not investigated, but some evidence has accumulated to suggest that the fluctuations may result from other mechanisms, not necessarily pathological (see Table II and Johnson, 1954).

(II) Clinical Picture of Chronic Prostatitis

The following plan was used in reconstructing the clinical picture of symptomatic chronic prostatitis. The records from the Urologic Outpatient Clinic, 141st General Hospital, Kyushu, Japan, were culled for men under 40 who complained of lower urinary tract symptoms and had enough palpable prostatic congestion to be rated as having Grade II encroachment, Oedema + +, but in whom no evidence of a urinary tract infection or obstructive uropathy could be found. Their symptoms were analysed. Then a second group of patients under 40, who presented a similar set of symptoms, was collected in the Urologic Outpatient Clinic, U.S. Army Hospital, Fort Sill, Oklahoma, during the study year, and their prostates examined. Simultaneously the relationships of both idopathic low backache, and acute and chronic anterior non-gonococcal urethritis to prostatic congestion were studied.

Between January 1, 1951, and November 30, 1953, almost 4,500 men under the age of 40 were admitted to the Urologic Out-patient Clinic, 141st General Hospital. Although the most common reason for reference was listed as "chronic prostatitis", the

most frequent cause was non-gonococcal urethritis (2,267 cases). Only 86 men were found who met the conditions outlined in the preceding paragraph: seventy were Caucasians, sixteen Negroes; the youngest was 21, the oldest 35; 23 were single and 63 married. The married men had been separated from their wives for 3 to 16 months. Only five were below the rank of sergeant and none was of higher rank than captain. Their past medical histories disclosed nothing noteworthy, and none had ever had gonorrhoea or non-gonococcal urethritis. As a group they were singularly intense, aggressive, compulsive, and efficient.

There were no virgins among the single men, but only fourteen had had sexual experiences in Japan, and not one had a Japanese mistress. The fourteen sexually-active men indulged sporadically, never more than once a month, and chiefly with American female personnel. All 23 were obsessed with the fear of contracting strange, recalcitrant, oriental, venereal diseases.

Of the 63 married men only eight had committed infidelities, and with six this had occurred only once; only one man had had extramarital intercourse more than twice and his indiscretions occurred about once every 4 months. The havoc wrought by these infidelities was amazing. These eight men were certain they had acquired something horrible and Asiatic which they would take home to their wives, to the ruination of their marriages and lives. The entire 63 considered themselves deeply attached to their wives, and that their couplings, when together, were frequent, ardent, and eminently satisfactory; the unfaithful eight were the most emphatic.

In 58 cases the primary complaint was of perineal distress which in 47 cases radiated into the scrotum, in forty there was a thin, watery urethral discharge, which occurred in twenty when the bladder was full, and was associated in the other twenty with defaecation, appearing most often on straining at the end of the act. In the majority of instances the discharge seen when the bladder was full proved to be a droplet of urine, but in a few instances it consisted of a little mucoid fluid which contained an occasional epithelial cell and a very rare leucocyte. The discharge accompanying defaecation was never examined. 24 men complainted of frequency, urgency, and nocturia, 23 of vague suprapubic cramps, 23 of aching in the scrotum, and fourteen of dysuria.

78 men had somatic symptoms not related to the urinary tract: nervousness, insomnia, headache, vertigo, lassitude, weakness, fatiguability, palpitation, heart consciousness, loss of appetite, indigestion, constipation, and vague muscular aches and pains, mostly in the buttocks and inner thighs, less often in the arms and legs. Although none of these symptoms individually was statistically significant, in the aggregate they loomed large to the patients, who considered them unpleasant side-effects of their basic urinary tract difficulties. Two symptoms were notable by their absence, namely backache and impotence.

In the year beginning July 1, 1955, and ending June 30, 1956, slightly more than 900 new patients were seen in consultation in the Urologic Clinic, U.S. Army Hospital, Fort Sill, Oklahoma, of whom almost 600 were men under 40. 76 of them presented symptoms virtually identical with the 86 described above. Again, backache and impotence were rarely encountered, only three men complaining of the former and none of the latter. Four of these had gonorrhoea and ten had non-gonococcal urethritis. Fifty of the 76 had jobs which entailed frequent, long rides in light vehicles over rough terrain. Only three were married, living with their wives, and enjoying satisfactory sexual relations, whereas sixty (almost 80 per cent.) indulged in coitus sporadically and less than once a month. These were significant deviations from the control group, in which there was an equitable distribution among occupations, those leading adequate sexual lives comprising 31 per cent. of the total, and those sporadically and infrequently active sexually only 40 per cent.

In 51 (67·1 per cent.) of the 76, palpable evidence of prostatic congestion was found. This, too, was a significant deviation from the controls. As noted, the overall prevalence was 41·2 per cent., and 51·3 per cent. for men experiencing inadequate sexual activity.

During the aforementioned year, 52 men were admitted to either the urologic or general surgical sections complaining of abdominal pain, right-sided in 25, left-sided in nineteen, and bilaterial in eight. After study they were proved to have seminal vesiculitis. Two had had previous gonorrhoea and eight non-gonococcal urethritis. 42 of these men (80·8 per cent.) had occupations entailing prolonged riding, while 39 (75 per cent.) had intercourse less than once a month. 38 (73·1 per cent.) had palpable evidence rectally of prostatic congestion. Thus, out of 128 men with symptomatic prostatitis, 92 (71·9 per cent.) had occupations involving much riding, 99 (77·3 per cent.) unsatisfactory sexual activity, and 89 (69·5 per cent.) congested prostates on rectal palpation, all significant deviations from the controls. Only six (4·7 per cent.) had an antecedent gonorrhoea and eighteen (14·1 per cent.) non-gonococcal urethritis.

73 men were examined during the study year with idiopathic low backache. Despite the relatively small size of the group, occupational and sexual activities followed the same pattern as in the control group. Only 28 (38·4 per cent.) had evidence of prostatic congestion. This was not a significant deviation.

115 men with acute and chronic anterior non-gonococcal urethritis were examined. No information relative to occupation and sexual activity was obtained. 48 (41·7 per cent.) had congested prostates when first seen. 74 were followed until cured, the criteria used being those established in another study (Gartman and Leibovitz, 1955); and 34 (45·9 per cent.) still had congested prostates. This confirmed the observations of the Camp Kilmer Group (Parrino, O'Shaughnessy, Green, White, and Silson, 1955; O'Shaughnessy and others, 1956) that anterior non-gonococcal urethritis bore no significant relationship to chronic prostatitis.

Discussion.—That a clinical entity emerged and that palpation of the prostate gland per rectum yielded pertinent data was no surprise. Later, more striking evidence of the value of digital examination will be given. There were, nevertheless, observations difficult to explain. The control group of 919 men represented a generous proportion of the personnel at Fort Sill. Therefore it appeared reasonable to assume that, at any time during the study year, there were many thousands of young men at Fort Sill with congested prostates, yet only in 128 did this produce enough symptoms to cause them to seek medical help. The preponderance of men with symptoms whose occupations caused frequent and prolonged pounding on the perineum and whose sexual relations were unsatisfactory suggested that, in emotionally susceptible individuals, both their occupations and their pre-occupations directed their attentions to their genital tracts and produced a preternatural awareness, often abetted by local tumescence of the prostate gland.

These inferences are, of course, not new. Rosenbloom (1955) made a similar suggestion; as a medical student almost 25 years ago I can remember hearing of a "lover's prostate"; and there are occasional references in the older literature to psychogenic prostatitis. In the old days, however, this diagnosis was only considered clinically, when no history of gonorrhoea could be elicited after intensive questioning.

(III) Treatment of Chronic Prostatitis

It has been shown that approximately 40 per cent. of all healthy young men at Fort Sill, Oklahoma, during the study year (July 1, 1955, to June 30, 1956) had asymptomatic prostatic congestion, yet only 128 men presented themselves during the same year with symptomatic chronic prostatitis. Since this group of 128 showed significant deviations from the controls in the prevalence of sexual frustration and in occupations requiring frequent rides over rough terrain and uniformly exhibited stigmata of emotional instability, it appeared feasible to suspect that all three factors played aetiologic roles, probably dominant.

If this view is correct, then sulphonamides and antibiotics should have little effect on the clinical course of the disease and this has been the recent consensus of opinion (Ghormley, 1952; Alyea, 1954; Cook, 1954; Fetter, 1949; Schatten and Persky, 1954). It likewise opens to serious question the wisdom of employing more drastic measures, such as transurethral resection, and these methods were not considered. This left only non-surgical methods of instituting or improving prostatic drainage: prostatic massage, urethral dilatation, and programmes involving superficial psychotherapy. In this study either reassurance or verbalization of symptoms was employed.

Prostatic Massage.—It has been generally conceded that prostatic massage does not cause all of the gland to discharge fluid, but, as far as I can ascertain, no one has hitherto attempted to estimate the size of the draining segment. To do this I have massaged about 500 glands under direct vision with the panendoscope lens located just distal to the verumontanum. Even the most vigorous massage made fluid escape only from the floor of the prostatic urethra. The floor formed about one-fourth of the mucosal surface, but subtended a somewhat larger segment of the body of the gland, estimated at *post-mortem* examination to be between one-third and two-fifths of the volume. Prostatic fluid, on the other hand, could be expressed readily from the other three surfaces of the prostatic urethra by gentle pressure with the beak of the panendoscope.

The prostates of fifty asymptomatic young men with glands rated at least Grade 1 encroachment and Oedema + were massaged with enough force to produce a copious discharge of fluid, and the glands were re-evaluated in 48 hours. If the gland was now rated Grade O encroachment, and Oedema O, it was classified as showing "Markedly improved"; if there was an appreciable decrease in the size or degree of oedema, it was classified as "Improved"; if there was no response as "Unchanged", and if either the size or degree of oedema had increased, as "Worse". In two of these fifty men the classification was "Markedly improved", in six

"Improved", in fifteen "Unchanged", and in 27 "Worse".

In 33 asymptomatic young men with prostate glands rated Grade I encroachment and Oedema + or better, the gland was re-evaluated 48 hours after coitus: in nineteen the classification was "Markedly improved", in seven "Improved", in six "Unchanged", and in one "Worse". Twelve similar men were examined within 48 hours of a nocturnal emission two were classed as "Markedly improved", five "Improved", five as "Unchanged", and none as "Worse". The response to masturbation was not investigated. Thus, with 45 men in whom the gland had been emptied physiologically, the classifications were: "Markedly improved"—21, "Improved"—12, "Unchanged"—11, "Worse"—1. Apparently there are more effective methods of evacuating the prostate gland than massage.

Sounds and Urethral Meatotomy.—Dilatation of the urethra and urethral meatotomy are considered by many to be useful adjuncts in the treatment of chronic prostatitis, allegedly because they "improve drainage". In voiding studies done on freshly dilated strictures it was observed that a urethra capable of taking a 24 F sound was adequate for micturition, and offered no impediment to drainage of the discharges of the secondary traumatic urethritis. In 750 consecutive cystoscopies on men over a 6-year period, a 24 F straight-beak sheath panendoscope could not be introduced in ten individuals because of the small urethral calibre (in seven because of unsuspected strictures, and in three because of unusually small penes). The 750 men required nineteen meatotomies.

The passage of a sound was simulated by inserting and withdrawing a 20 F curved-beak sheath panendoscope under direct vision in over 100 men. Pressure was exerted only against the floor of the prostatic urethra and fluid was expressed from this quadrant alone. With a panendoscope inserted through a suprapubic fistula it was noted that the tip of a 26 F sound in the urethra could be pressed against all walls of the prostatic urethra only with considerable difficulty and at the hazard of puncturing the gland.

25 men, who had been treated elsewhere for chronic prostatitis by regular soundings, and who had no evidence of a stricture, were surveyed by means of urethrograms. Six had unsuspected false passages.

Therapy.—In view of the above, the use of prostatic massage, urethral dilatation, and urethral meatotomy was abandoned, and two programmes of treatment were employed:

(1) At the 141st General Hospital, Kyushu, Japan, the patients were seen as often as they felt the need; at each visit their external genitalia were scrupulously examined for evidence of venereal disease, multi-glass urine tests were done, and the prostate gland was palpated gently once every fourth to sixth visit. They were given reassurance at every visit that they had no serious illness, and the married men were told their symptoms would disappear as soon as they were re-united with their wives.

(2) At the U.S. Army Hospital, Fort Sill, Oklahoma, during the study year, the patients were given regular weekly appointments in writing, the frequency of visits decreasing as they improved. At each visit their symptoms were reviewed in lengthy detail and the patients encouraged to talk about their illnesses; then their external genitalia were inspected casually, a multi-glass urine test was done, and the prostate gland was palpated, care being taken to impress upon them that this was an examination, not a treatment. No fluid was ever expressed, no reassurance was given, and they were not advised that regular sexual intercourse would help.

Results

(1) At the 141st General Hospital 86 men were handled under the first regimen. Their symptoms and physical findings have been given in detail. All had prostate glands which were classified initially as Grade II, Oedema + +. They were under observation for 4 months or more, the longest for 17 months; they averaged almost two clinic visits a week and few were seen less than twice a month. They seemed pleased with the thoroughness of the examinations, but irritated by the reassurance, which they were frank to admit, they considered as merely making light of their problems. 23 single and five married men returned to the United States at the end of their tours unrelieved and dissatisfied. No significant change was noted in the size and consistency of the glands, and all were classed as failures.

58 men were joined by their wives and were stationed in Kyushu for at least another year. No improvement was noted before the reunion; in fact, there was often an acute exacerbation just before it, but after their wives had arrived none of the men ever came back to the Urologic Clinic voluntarily.

All were contacted personally and, often with considerable embarrassment, affirmed that they were now asymptomatic; 21 were finally prevailed upon to return for evaluation, and ten of them still had congested prostate glands.

Despite the spectacular disappearance of symptoms after these reunions, reassurance had been a therapeutic failure and had benefited none of the 86 patients.

(2) At Fort Sill 128 men, whose clinical picture has also been described, were handled; 89 (69·5 per cent.) of them had palpable prostatic congestion, and 39 did not. The Fort Sill group, on the whole, were favourably impressed by their treatment, particularly by the privilege of talking about their illnesses and the regularity with which their prostates were examined. Those who had been previously treated for prostatitis elsewhere frequently expressed the opinion, without solicitation, that they preferred the gentle way I massaged their glands, and that they felt so much better afterwards.

Of the 89 with palpable congestion, 52 were followed until local signs disappeared. This occurred in from one to 23 weeks, the majority taking under 15 weeks (average over 8 weeks). In 38 there was concomitant relief of symptoms, in fourteen there was none. Six of the remainder obtained relief in 2 to 6 weeks without demonstrable changes in the gland, while 28 were inadequately followed, and three married with a resultant disappearance of signs and symptoms.

In fifteen of the 39 men without palpable congestion, symptoms vanished spontaneously in 2 to 6 weeks, there was no change in fourteen in 22 to 35 weeks, and ten were inadequately followed.

To sum up, ninety patients were adequately followed, three of whom married, leaving 87 to be evaluated. 59 (67·8 per cent.) were helped by the second regimen; but palpable changes in the prostate mirrored the symptomatic response in only 41 of these ninety men (45·6 per cent.). For both groups, palpation of the prostate yielded results reflecting the symptomatic response 79 times in 139 instances (56·8 per cent.) which is slightly better than the probability due to chance. Although the second regimen proved more satisfactory to the patient, it cannot be said whether this was due to ventilation of symptoms, or to palpation of the prostate gland, misinterpreted by many as a therapeutic procedure.

Discussion.—Comparisons between the results obtained in this study and earlier investigations did not prove feasible, because of differences in criteria: cellular content or bacterial flora of the prostatic fluid on the one hand and palpation on the other. But certain pertinent observations did emerge:

(1) Palpation of the gland did not yield results which reflected the symptomatic response;

(2) A combination of verbalization and massage of the prostate per rectum was moderately helpful, but adjustment of psycho-sexual imbalances proved truly dramatic.

Unusual circumstances in the Korean conflict, and the resumption of travel by dependents in the late Autumn of 1951, left me in a position to observe the effects of family reunions after long and often hazardous separations. This spotlighted the large psychogenic component of chronic, non-specific prostatitis, an ill-defined symptom-complex with negligible physical or laboratory signs, whose response to therapy was best measured in disassociated symptomatic relief.

(IV) Acute and Chronic Infectious Prostatitis, Based Upon 277 Consecutive Cases Secondary to Lower Urinary Tract Infections

Material.—228 patients were treated at the 141st General Hospital, Kyushu, Japan, between January 1, 1951, and November 30, 1953; and 49 at the U.S. Army Hospital, Fort Sill, Oklahoma, between February 2, 1954, and March 31, 1955. The primary urologic lesions were as follows:

Chronic posterior non-gonococcal urethritis—165,

Haemorrhagic cystitis involving the posterior urethra —73,

Chronic posterior urethritis secondary to urethral strictures—19,

Acute, diffuse urethritis secondary to severe urethral trauma—17,

Acute posterior gonococcal urethritis—3.

This material has been used in other investigations (Gartman, Edward and Leibovitz, 1955; Gartman, 1956).

Symptomatology.—In the cases of urethral injury, the catastrophe camouflaged the prostatitis and the latter was virtually an incidental finding. Difficulties in voiding led to the admission of eight strictures, ten patients were first seen because of violent attacks of pyelonephritis, one because of an acute epididymitis, and none because of their prostatitis. Two of the three cases of gonococcal posterior urethritis came in because of violent haematuria, and the third with an acute epididymitis. The two men with bleeding had huge prostatic glands; one, previously reported by Gartman (1956a), so big that the palpating finger could not override it, yet neither had complaints other than bloody urine.

Of the 165 cases of chronic posterior non-gonococcal urethritis, 78 complained only of discharge and occasional dysuria, symptoms of the uncomplicated disease; 72 presented with perineal distress, invariably radiating into the scrotum; 49 with haematuria, and thirty with frequency, urgency, nocturia, strangury, vesical tenesmus, suprapubic cramps, and alterations in the size and force of the urinary stream. On investigation, 28 had a trigonitis, and 137 did not. Fifteen of the 28 with trigonitis complained of perineal distress, ten of bleeding, and 22 of frequency, urgency, and nocturia. Of the 137 men without trigonitis, 57 complained of perineal distress, 39 of bleeding, and only eight of urinary difficulties.

With the 73 cases of haemorrhagic cystitis, bleeding was the cardinal symptom; in addition, in 21, severe perineal pain often gave rise to a straddle gait, and in 69 there was frequency, urgency, and nocturia. In the downward extension of the disease, involvement of the trigone was inescapable. It should further be pointed out that cystitis limited to the dome produced only painless haematuria; once the trigone was attacked, even in the absence of a posterior urethritis and prostatitis, then the painful urinary difficulties appeared, suggesting that these symptoms originated in trigonal rather than prostatic irritation.

In the absence of an acute pyelonephritis, not a single man complained of backache.

Thus it seemed that the only symptom directly attributable to the prostate was perineal distress radiating into the scrotum, which was present in 93 of the 277 men. With many this was no more than a sense of fulness elicited on close questioning, but in eighteen it was a primary complaint, aptly described as "sitting on a hot potato".

Bacteriological Studies.—Thirty healthy, asymptomatic young men with physiological prostate glands on rectal palpation were examined in the following manner:

> Without preliminary cleansing, cultures were taken from urethral scrapings at the level of the fossa navicularis; the glans and meatus were then cleansed, the urethra irrigated with isotonic saline solution, and the cultures repeated; the cleansing and irrigation were done again, the prostate massaged and the fluid cultured.

In only four prostatic fluid cultures was there no evidence of contamination by organisms found either in the pre-cleansing or post-cleansing urethral scrapings. Therefore, it was felt that cultures of prostatic fluid obtained after massage at the urethral meatus were valueless. Many other observers have reached the same conclusion and the reader is referred to Ghormley (1952) for a description of the elaborate techniques which have been used to avoid urethral contamination.

Physical Signs and Diagnosis.—The most significant diagnostic sign was found on rectal palpation. Only 26 men (about 9 per cent.) did not have large, bulging prostatic glands. 81 reached Grade I, 143 Grade II, 24 Grade III, and three Grade IV. This was in sharp contrast to symptomatic chronic non-specific prostatitis, where palpation yielded positive findings in only 69·5 per cent. and none of the glands encroached more than Grade II. The examination of prostatic fluid, as has been pointed out, was often misleading. The fluids of 74 patients with relatively mild infections were studied, and in only 31 (41·9 per cent.) were there over thirty white blood cells per high-power field on microscopy, while in 25 (33·8 per cent.) there were less than ten white blood cells. In 92 healthy, asymptomatic volunteers with clinically normal glands, 31·5 per cent. had less than ten white blood cells per high-power field and 33·7 per cent. contained more than thirty.

In the 26 men without palpably distended glands, the diagnosis was made at surgery six times (urethral injuries), cystoscopy nineteen times (posterior non-gonococcal urethritis twelve, haemorrhagic cystitis seven), and inferentially once, when the multi-glass urine test gave evidence of a severe posterior urethritis.

Clinically, it was frequently difficult to distinguish the acute process from the chronic. This was especially so with non-gonococcal urethritis, where over half the patients (98) already had prostatitis when first seen. On the other hand there could be little question in an explosive case of haemorrhagic cystitis. Thus, 98 cases were considered chronic and ninety acute, and in 89 the phase was undetermined.

Complications.—61 cases of acute pyelonephritis and nineteen of acute epididymitis were seen, but it seemed more likely that these were complications of the primary lesions, rather than of the prostatitis, itself a complication. In 46 instances upper urinary tract infection was the principal reason for consultation and in fourteen the reason was epididymitis.

The others occurred in patients already under observation. None was a serious problem. No prostatic abscesses were encountered.

Therapy.—In most instances treatment was directed solely at the basic lesion, never at the prostatitis itself. Save in the seventeen cases of urethral injury,

where therapy was either surgical (nine) urethroplasties (Gartman, 1956c) or splinting urethral catheters and sounds in conjunction with adequate antibiotics, it was the policy to handle the infection first. In 1951, 1952, and the early part of 1953, the drug used was the one with the optimum effect *in vitro* on bacterial isolates obtained either by catheterization or at cystoscopy after aseptic preparation of the external genitalia. About May, 1953, the empirical use of one of the broad spectrum antibiotics was introduced. Oxytetracycline given in doses of 250 mg. every 4 hrs was the drug chiefly employed, but Furadantin, in doses of 100 mg. every 4 hrs has been used with increasing frequency since 1954. No attempt was made to compare their efficacy and other drugs were rarely employed. With the urethral strictures, sounds were not used until the patient was afebrile and the gross pyuria gone. Save in the 74 men mentioned above, whose prostate glands were massaged to obtain fluids for comparative study, prostatic massage was not used, therapeutically or otherwise at any time.

Results.—196 patients were followed until a clinical remission of the basic lesion had occurred. This included only six of the 17 urethral injuries. At the end of treatment, 28 (14·3 per cent) patients still had prostate glands which were found to encroach to between Grade I and Grade II per rectum, but the bulging, turgid feeling had been replaced by the characteristic oedema of chronic non-specific prostatitis. This was markedly lower than the 41·2 per cent. incidence of prostatic congestion in 919 healthy, asymptomatic young men at Fort Sill in 1955–56, and significantly lower than the 30 per cent. found in 309 similar young men in random samplings at overseas stations between 1943 and 1951.

Discussion.—Four observations of particular interest stand out:

(1) Palpation revealed more accurate diagnostic information than examination of prostatic fluid;

(2) The high rate with which palpable prostatic congestion disappeared after treatment;

(3) The gonococcus caused only about 1 per cent. of the lesions;

(4) There were no complicating prostatic abscesses.

The first observation confirmed earlier observations, but the second was paradoxical. In 115 patients with uncomplicated, anterior non-gonococcal urethritis, the incidence of palpable prostatic congestion was 42 per cent. before treatment, and 45 per cent. after a clinical "cure". (For criteria see Gartman and Leibovitz, 1955). It may be asked why antibiotics were capable of reducing the incidence of prostatic congestion to a mere 14 per cent. when used against infections in the prostate, but exerted no influence on the prostate when employed in treating infections in the distal urethra? The available evidence offers no immediate answer.

The relatively minor aetiological role of the gonococcus and the absence of complicating prostatic abscesses emphasized the high degree to which the current studies have been coloured by agents now available. For instance, Young, Gerahty, and Stevens (1906) found the incidence of previous gonorrhoea in 358 cases of chronic non-specific prostatitis to have been 73 per cent. Ghormley (1952) found an incidence of 38 per cent., and I, dealing with younger men, obtained only 4·7 per cent. in 1955–56. This may largely account for the discrepancies between these presentations and those written in the pre-antibiotic era, but not entirely. First, none of the earlier studies were gauged against normal controls. Johnson (1954) was apparently the first investigator who made a systematic survey of prostatic fluids of healthy, asymptomatic men of all ages. Thus, Young and others (1906) assumed that the aetiology of 73 per cent. of their cases was the previous gonorrhoea, but, 73 per cent. may possibly have been the incidence of previous gonorrhoea in the male population at large at that time. The incidence of previous gonorrhoea in 128 cases of symptomatic prostatitis was, as noted, 4·7 per cent., but it was also 3·9 per cent. in 919 controls observed concurrently. Secondly, there can be little doubt that earlier writers included lesions no longer considered as facets of prostatitis, and attributed to prostatic infection symptoms which were more probably expressions of inflammation in contiguous structures. Young and others (1906), in what seems to be the first paper delineating the modern concept of chronic non-specific prostatitis, included fibrous contracture in their study. While the aetiology of this lesion is still obscure, virtually no one now considers it to be a phase of chronic prostatitis, and there are even many who doubt that there is any relationship between the two. Again, urinary difficulties (namely urgency, frequency, nocturia, and strangury) were commonly thought to be due to the inflammation in the gland. Although these are frequently symptoms of lower urinary tract obstruction, a better understanding of the physiology of micturition suggests that they are of trigonal origin, and evidence of this has been presented in substantiation.

The conclusion is that infectious prostatitis in the antibiotic era is a relatively innocent and comparatively silent complication of diffuse lower urinary tract infections. Before the discovery of antibiotics, involvement of the prostate gland may have been a portentous and serious event.

Summary

(I) Incidence of Asymptomatic Chronic Prostatitis

919 healthy young men between the ages of 17 and 40 years were examined for evidence of asymptomatic prostatitis, which was found in 379 (41·2 per cent.) Sexual activity apparently influenced the incidence but not climate or physical activity.

(II) Clinical Picture of Chronic Prostatitis

86 young men with marked prostatic congestion who complained of lower urinary tract symptoms in the absence of either a urinary tract infection, or of an obstructive uropathy, were studied. These men were aggressive, efficient, and compulsive, and had either been continent for long periods, or had been sporadically and inadequately sexually active. Their urinary symptoms consisted of perineal distress, a thin, watery urethral discharge, which was often only a drop of urine, urgency, frequency, nocturia, vague suprapubic distress, aching in the scrotum, and dysuria. Psychogenic overtones were marked and those sexually active had obsessive fears of venereal disease.

Using these symptoms as a key, a second group of 76 men were studied, of whom two-thirds exhibited prostatic congestion on rectal palpation. To these were added another 52 men who were hospitalized as emergencies, either because of suspected appendicitis or of ureteral calculus, but who proved to have seminal vesiculitis. Evidence of prostatic congestion was found in 73·1 per cent. of these 52 men. Thus almost 70 per cent. of 128 men with symptoms suggestive of so-called chronic prostatitis had demonstrable prostatic congestion. Only six (4·7 per cent.) gave a history of previous gonorrhoea, and eighteen (14·1 per cent.) of non-gonococcal urethritis. These were not significant deviations from the controls (3·9 per cent. for gonorrhoea and 12·7 per cent. for non-gonococcal urethritis). A significant number of these men were engaged in occupations producing frequent pounding upon the perineum and led unsatisfactory or frustrating sexual lives. All of these facts suggested that so-called chronic prostatitis in young men may be only a somatic expression of sexual frustration.

Low backache and anterior non-gonococcal urethritis bore no significant relationship to prostatic congestion.

Conclusion.—Chronic prostatitis was an uncommon disease in men under 40 years of age both in Kyushu, Japan, and in Fort Sill, Oklahoma. It occurred primarily in susceptible individuals whose occupations and sexual pre-occupations directed their attentions to their lower urogenital tracts.

(III) Treatment of Chronic Prostatitis

(1) It was demonstrated at cystoscopy and at the autopsy table that both prostatic massage and urethral dilatation induced drainage from considerably less than half the prostate gland. Fifty men with prostatic congestion were re-examined 48 hours after vigorous massage; the congestion had disappeared in two and was aggravated in 27. Examination of 45 men with prostatic congestion 48 hours after coitus or a nocturnal emission disclosed, in contrast, subsidence of all congestion in 21 and aggravation in only one.

(2) In only ten of 750 men was the urethra too small to take a 24F sheath panendoscope. A urethral lumen of 24F calibre had proved adequate for micturition and drainage of urethral discharges. The routine and frequent passage of large sounds through the physiological urethra was not without hazard, since urethrograms done on 25 men so treated revealed six unsuspected false passages.

(3) In a group of 86 men with marked prostatic congestion, a regimen consisting primarily of reassurance proved totally ineffectual; in 58 men, reunion with their wives resulted in prompt, dramatic symptomatic relief.

(4) In a group of 128 men with symptomatic prostatitis, who were treated by allowing them to discuss their symptoms at length and by palpation of the prostate gland at regular intervals, there was a satisfactory symptomatic response in 59 (67·8 per cent.) of 87 adequately followed. Three additional men were relieved of symptoms by marriage. However, changes in the size and consistency of the prostate gland reflected the symptomatic response in only 79 (56·8 per cent.) out of 139, a yield too close to the probability due to chance to be significant.

(IV) Acute and Chronic Infectious Prostatitis

(1) 277 cases of infectious prostatitis secondary to severe lower urinary tract infections were studied. In only three was the gonococcus the aetiological agent.

(2) Rectal palpation was diagnostic in 91 per cent. of the cases, and examination of prostatic fluid in 42 per cent.

(3) The only symptom directly attributable to the prostate was perineal distress, which was present in one-third of the patients.

(4) Response to antibiotics was very satisfactory. After the resolution of the basic infection, only 14 per cent. of the patients followed still had palpable prostatic congestion, in contrast with an incidence of 41 per cent. in one large group of healthy controls, and of 30 per cent. in another.

(5) 61 cases were complicated by pyelonephritis, and nineteen by epididymitis, neither of which presented problems of consequence. No prostatic abscesses were seen.

Conclusion

It is apparent that prostatic physiology needs and merits more adequate investigation.

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For the best available history of the evolution of the concept of chronic non-specific prostatitis up to the dawn of the antibiotic era, the reader is referred to Ghormley (1952), a veritable gold-mine of information.

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